

Industrial Pollution Action Team

DISCUSSION DOCUMENT

Prepared for the Hon. Leona Dombrowsky

Minister of the Environment

Final Report – Industrial Pollution Action Team

July 30, 2004

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Executive Summary

On April 19, 2004, Minister of the Environment Leona Dombrowsky announced the formation of an eight-member Industrial Pollution Action Team (IPAT). The mandate of IPAT was to "examine the causes of industrial spills and dangerous air emissions and recommend to the government prevention measures for industry and others." This report reflects the Team's responses to that challenge.

We found a system that was largely in compliance with its regulatory requirements, yet where spills to air and water still occur from time to time. We could not therefore avoid the conclusion that the existing system of approvals, inspection, enforcement, and prosecution is not working as well as it should. These observations speak to a complex set of circumstances, involving failures not only of infrastructure but of operating procedures and associated human resources. As a result, it is our view that there is no simple solution for the prevention and management of spills in the St. Clair River area. Although some short-term actions are possible and necessary, we believe that a long-term solution will require a multi-pronged approach, including:

- ☐ Introduction of regulatory requirements for pollution prevention plans, spill prevention plans including multiple barriers, and spill contingency plans
- ☐ A comprehensive risk-based approach to approvals, spill prevention and management, notification and enforcement
- ☐ Regular review and revision of regulatory limits for air, water and waste emissions
- ☐ A legislative framework that incorporates economic or other incentives to go beyond compliance
- ☐ Regulatory requirements for operator training and private laboratory accreditation
- ☐ Review and restructuring of ambient monitoring programs
- ☐ Establishment of a Ministry analytical laboratory in the Sarnia area
- ☐ Improved spills notification and routine communication systems, including resolution of jurisdictional confusion

The comments provided in this report are our personal opinions and not those of any constituency we serve, and are offered only in our personal and professional capacities. We hope that our findings will stimulate a more in-depth analysis of the technological, regulatory, and behavioural factors that underlie spills, and prompt a substantive public dialogue about the prevention and elimination of spills events in the St.

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Clair River region and elsewhere in the Province.

1. Introduction

On April 19, 2004, Minister of the Environment Leona Dombrowsky announced the formation of an Industrial Pollution Action Team (IPAT). The mandate of IPAT was to "examine the causes of industrial spills and dangerous air emissions and recommend to the government prevention measures for industry and others." Eight members were named to the Team:

☐ **Maria Van Bommel, MPP, co-chair**

Maria Van Bommel is the MPP for the riding of Lambton-Kent-Middlesex and currently serves as Parliamentary Assistant to the Minister of Municipal Affairs and Housing (Rural).

☐ **Isobel W. Heathcote, co-chair**

Isobel Heathcote is a professor in the School of Engineering and the Faculty of Environmental Sciences, and Dean of the Faculty of Graduate Studies, at the University of Guelph. She is currently Canadian Co-chair of the International Joint Commission's Science Advisory Board. From 1979 to 1985, she held a number of positions in the Water Resources Branch of the Ministry of the Environment.

☐ **James Thomas Brophy**

James Brophy is executive director of the Occupational Health Clinic for Ontario Workers, Sarnia-Lambton. He holds a PhD in occupational health from the University of Stirling, Scotland. His areas of focus are occupational and environmental cancer; education and awareness; and cancer prevention.

☐ **Donna Day**

Donna Day is a former chief of the Walpole Island First Nation, one of the first native communities in Canada to take leadership in the field of environment and sustainable development.

☐ **Ken Drouillard**

Ken Drouillard is a researcher with the Great Lakes Institute for Environmental Research and assistant professor in the Department of Biology at the University of Windsor. His research interests focus on modelling pollutant exposures in fish and wildlife, contaminated sediments and water quality.

☐ **Darren Henry**

Darren Henry is a band council member of the Aamjiwnaang First Nation and chair of the band's environmental committee.

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☐ **Charles Q. Jia**

Charles Jia is an associate professor and coordinator of occupational health and safety with the Department of Chemical Engineering and Applied Chemistry, University of Toronto. His research interests are concerned with applying sciences and engineering principles to environmental problems. His current focus is on the development of technologies for multi-pollutant abatement in natural resource industries.

☐ **Bela Trebics**

Bela Trebics is chair of the Wallaceburg Advisory Team for a Cleaner Habitat (WATCH), Canadian chair of the St. Clair River Bi-National Public Advisory Council and vice-president of Friends of the St. Clair River. He helped implement the ISO 14001 environmental management system at Oxford Automotive in Wallaceburg.

In our work, we were fortunate to be able to draw on the resources of diverse groups and individuals throughout the Province. In particular, we are grateful for the cooperation of the communities, the Sarnia Lambton Industrial Association (SLEA), Ministry staff, IJC observer Dr. Gail Krantzberg, and members of the environmental law community who gave generously of their time and expertise to support our task.

We undertook our work within a framework of five main areas of investigation:

- ☐ Spills prevention
- ☐ Spills detection on- and off-site
- ☐ Spills response and notification
- ☐ Human and ecosystem health impacts
- ☐ Communications

1.1 Concerns Expressed by the Communities

In establishing IPAT, Minister Dombrowsky placed particular emphasis on the need for a community-based process and community perspectives on the problem of spills to the St. Clair River. Throughout our work, we have been moved by the profound impact that repeated spills to the river have had and continue to have on local residents. The communities are deeply concerned about the short and long term impacts on human health of repeated, serious spills to air and water in the St. Clair River area, and the implications those spills may have for aquatic and terrestrial habitats. Community representatives repeatedly reminded us that this is a longstanding problem, with many spills over many years.

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They are of the view that offenders have not received sufficient (or in some cases any) penalties for spill events, and may be considering spill-related fines as simply the “cost of doing business”. And although we heard evidence that the frequency of spills to water has declined substantially in recent years, we share the communities’ concern that spill events may once again be increasing.

Although some IPAT members had the opportunity to meet informally with local stakeholders to discuss their concerns, our time frame was too short to allow meaningful consultation. Similarly, although we were able to meet with the Sarnia Lambton Environmental Association and representatives of specific industries, we did not attempt any comprehensive consultation with industry.

1.2 Guiding Principles

In our work, a number of guiding principles emerged, endorsed by Ministry staff, industrial representatives, and community members alike. There was general agreement among stakeholders that spill prevention and management systems should be:

1. Transparent and accountable
2. Preventive, avoiding accidental and deliberate non-compliant releases
3. Polluter-pay
4. Redundant, employing multiple barriers
5. Equitable
6. Regularly updated and continuously improved

One fundamental principle was that spill prevention and management is a multi-stakeholder process that should have the community as a central participant. In our view, affected communities must be fully and meaningfully involved in all decisions that affect their environment, their health and their well-being, including decisions about acceptable risk. This theme will be emphasized throughout this report.

As we examined the problem of spills to the St. Clair River, we quickly realized that a spill is by definition an error, caused either by failed technology or by human error, or both. For that reason, we concluded that we must address both the technology causing spills, and its human operators. Consideration of technology in turn led us to examine the ways in which pollution control equipment is proposed and approved in Ontario, and thus to the Ministry’s process for reviewing and approving technology applications.

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This report therefore considers not only spills themselves, but also the administrative and technological framework within which error-prone technology is allowed to operate, and the materials used in the industrial processes employing that technology. Although our mandate centres on the prevention and management of spills to air and water, we believe that it cannot be separated from a more general consideration of pollution prevention (that is, reduction or elimination of the most toxic materials) and of Ontario pollution abatement strategies in general.

Furthermore, while spills are a matter of serious concern, we believe that outdated regulatory limits and associated “in compliance” emissions to air and water may represent a more serious and ongoing risk, especially to communities that are exposed to the emissions repeatedly and for extended periods of time

The following paragraphs describe the ways in which we undertook our work, the conclusions we drew from it, and the actions we recommend for a variety of stakeholders.

2. Our Process

Although our time frame was very short, we were fortunate to be able to meet with a wide range of stakeholders from the Ministry, industry, and local communities. These include:

- ☐ Sarnia Lambton Environmental Association (SLEA)
- ☐ Industrial representatives (Dow and Nova)
- ☐ Ministry of the Environment (MOE) senior staff from a variety of areas including the SWAT team
- ☐ MOE District Office staff
- ☐ Community groups and individual citizens

These groups and individuals supplied us with a great many documents which, while not in any sense comprehensive documentation of Ontario's current spill management system, did provide us with many useful insights. These documents included:

- ☐ Environmental legislation, with particular attention to the Ontario Environmental Protection Act (EPA), the Canadian Environmental Protection Act (CEPA), and associated regulations
- ☐ Municipal Industrial Strategy for Abatement (MISA) documentation including the original Best Available Technology reports for the Organic Chemical Sector, the Inorganic Chemical Sector, and the Petroleum Refining Sector, and the draft final report of the Issues Resolution Process
- ☐ The MOE spills notification protocol
- ☐ SLEA spills notification and continuous improvement protocols
- ☐ A wide range of other documentation prepared by MOE staff, summarizing for example the causes of recent spill events in the St. Clair River region
- ☐ Local media reports
- ☐ IJC report: "Spills: the Human-Machine Interface", dated June 1988
- ☐ A wide variety of other documents including excerpts from the legal codes of many countries, environmental policy documents from the Organisation for Economic Cooperation and Development, the Canadian Environmental Law Association, the Walkerton investigation, and similar groups.

Clearly our limited time frame was much too short to allow an in-depth examination of the technologies or operating practices at individual plants. In addition, and for a number of reasons including confidentiality

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and pending enforcement actions, we were unable to access many documents that we believe would have been important to our work. These factors have limited our ability to confirm assertions made by various parties and gain a comprehensive understanding of the causes of and possible responses to fugitive air emissions and spills in the St. Clair River area. We have done our best to confirm the facts from materials available to us, and regret if our short timeline resulted in minor errors in this report.

Our process also did not afford the committee sufficient opportunity to learn the details of many current Ministry initiatives, for instance the recently-announced Five-Point Plan for Cleaner Air. Our report may well have implications for those initiatives, and we hope that Ministry staff will be able to benefit from this report in those contexts.

We reiterate that the comments provided in this report are our personal opinions and not the opinions of any constituency we serve, and are offered only in our personal and professional capacities. We hope that our findings will stimulate a more in-depth analysis of the technological, regulatory, and behavioural matters that contribute to spills prevention, and prompt a substantive public dialogue about the prevention and elimination of spill events in the St. Clair River region and elsewhere in the Province.

Some Definitions

In our work, we repeatedly encountered three terms, "pollution prevention", "spill prevention", and "spill contingency planning". These terms have very different meanings and very different implications for an environmental management framework. For the sake of clarity, we define our understanding of them as follows.

Pollution Prevention: A design process for avoiding the creation of adverse effects on the environment (which materials to use, and how they are used, and the nature of air, water, and solid waste emissions). This step is a preventive process based on assessment of the risks inherent in specific materials and processes.

Spill Prevention: Advance planning to anticipate and provide for the avoidance of spills. This step should include consideration of high-risk processes, materials, and particularly vulnerable (e.g., ageing) infrastructure, as well as the potential implications of different kinds of spill events for on-site operations and off-site human and environmental systems. This step is preventive in the sense that it involves advance planning, but it implies the existence

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of a hazard that might or should have been eliminated in a pollution prevention stage. Preventive maintenance and regular inspection of infrastructure is an integral part of spill prevention.

Spill Contingency Planning: Advance planning to anticipate and provide for the kinds of spill events that may occur at an industrial or municipal facility, including planning for on-site containment, emergency response, treatment/mitigation, and notification procedures. Spill contingency planning is necessarily a process designed to respond to a failure of pollution control systems. It is not designed to prevent a spill, but rather to reduce or eliminate the impacts of a spill once it has occurred.

3. Our Findings

The single clearest message that we received from Ministry staff and industrial representatives was that facilities in the St. Clair River region are largely in compliance with their Certificates of Approval and with regulatory requirements in general¹. If we accept these statements, we cannot avoid the conclusion that the existing system of approvals, inspection, enforcement, and prosecution is not working as well as it should. Ministry staff informed us that common causes of spills include:

Spills to water:

- ☐ Leaks from heat exchangers (once-through cooling water systems)
- ☐ Leaks from pipes or valves
- ☐ Overflows of products from containers, gaining access to the river via storm sewer systems
- ☐ Capacity problems with treatment and/or containment systems due to storm events
- ☐ Contaminated runoff from fires
- ☐ Power outages and other unplanned equipment shut-downs
- ☐ Human error – failure to properly operate or maintain a system

Spills to air:

- ☐ Operational problems with flares
- ☐ Equipment leaks (valves and piping)
- ☐ Spills to ground on-site, causing emissions to air
- ☐ Poor maintenance of air emission control equipment
- ☐ Fires
- ☐ Loading/unloading operations
- ☐ Lack of air emission control equipment
- ☐ Human error – failure to properly operate or maintain a system

These observations speak to a complex set of circumstances, involving failures not only of infrastructure but of operating procedures and associated human resources. As a result, it is our view that there is no simple solution for the prevention and management of spills in the St. Clair River. Although some short-term actions are possible and necessary, we believe that a long-term solution will require a multi-pronged approach encompassing:

¹ We were unable to verify these statements through investigation and enforcement records, because many relevant documents were embargoed in enforcement and prosecution activities.

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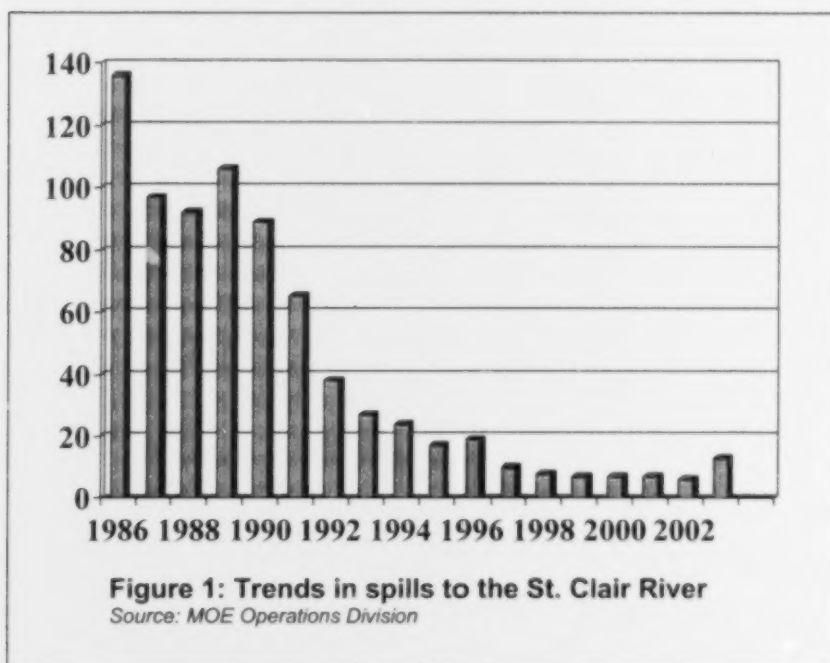
- ☐ Regulations and incentives for pollution prevention and life cycle assessment
- ☐ Regulations and incentives to encourage the use of less toxic materials
- ☐ Regulatory requirements for spill prevention plans
- ☐ Regulatory requirements for multiple barriers between the point of use and the point of discharge
- ☐ Mechanisms (regulatory or otherwise) of encouraging review and updating of technology
- ☐ Methods of reducing human error in routine operations and spill response
- ☐ Regulatory revisions for penalties for spills, especially for repeat offenders
- ☐ Mechanisms of building trust and developing partnerships between concerned parties
- ☐ A strategy for moving toward risk- or impact-based regulations
- ☐ Unambiguous definition of a "spill" to air and to water
- ☐ Harmonization of notification and reporting requirements with neighbouring jurisdictions, especially the State of Michigan and US EPA

Finding 1: Ontario's environmental management framework is largely reactive, not preventive

We note that although the Ministry initiated a Spills Prevention Strategy in 1990, and contemplated pollution prevention legislation in the mid 1990s, neither appear in current regulatory structures. It appeared to us that there was no regulatory requirement for pollution prevention or spill prevention under Ontario environmental legislation. Generally speaking, we found no preventive regulatory framework at all. Instead, existing systems appear almost entirely reactive rather than preventive. We found no mention of required pollution prevention plans, nor of positive incentives to go beyond compliance levels. Rather, our perception was of a system heavily focused on punishing offenders, rather than supporting and rewarding companies with excellent compliance records and those that attempt environmentally protective innovations.

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Nevertheless, we were pleased to observe a significant decrease in the number of spills to water reported in the St. Clair River from 1986 to 2003 (see Figure 1). Both Ministry and industry representatives indicated to us that these trends resulted primarily from the introduction of MISA (Clean Water) regulations in the 1990s, although we were unable to verify those comments independently because many relevant documents were inaccessible to us.



We also heard comments to the effect that current method detection limits for continuous monitors are much lower than those used in the 1980s. As a result, it is possible that spill frequencies were actually under-reported at that time, at least using current criteria.

Pollution Prevention

We note that Ontario's environmental regulatory structure for air and water pollution control has typically focused on the point of discharge, rather than the point of use or creation of pollutants. Whereas the Canadian Environmental Protection Act, Part 3, Section 46, appears to empower the federal Minister of the Environment to issue notices to dischargers regarding "the release of substances into the environment at any stage of their life-cycle; [and] pollution prevention", no such provision

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appears to exist under the Ontario Environmental Protection Act or the Ontario Water Resources Act.

We believe that a life cycle approach may indeed be essential in managing not only spills but toxic substances in routine use. Emphasizing end-of-pipe discharges is not enough. In the absence of uniform, province-wide regulatory limits for municipal stormwater systems and sewage treatment plants², any attempt to "tighten up" effluent discharge requirements for direct dischargers could result in a transfer of discharges to municipal sewer systems to avoid discharge limits, such as occurred with the metal casting (foundry) sector under MISA. While we recognize that this may be unlikely in the Sarnia area, because of the high volume of industrial wastewaters relative to the municipal wastewater flow, it is potentially important elsewhere in the Province. In our view, pollution prevention and spill prevention legislation is an essential component of a preventive environmental management framework. Ideally, such legislation should enable regulatory control of any stage of a product or substance life cycle, not just at the point of discharge. Although we understand the need for protection of proprietary interests, we believe that the Ministry has a responsibility on behalf of the public to be accountable for pollution and spill prevention activities.

This is not to say that the Ministry has been silent in the area of pollution prevention. We note in particular the Ministry's efforts in the mid-1990s to establish voluntary pollution prevention agreements with a number of industrial sectors, including automotive manufacturing, the metal finishing industry, the printing and graphics industry, and the Canadian Chemical Producers' Association. Much work remains to be done, however. In part this may be because voluntary agreements alone provide insufficient incentive to reduce the use of toxic materials – those most of concern in spill events. In addition to voluntary agreements we believe that it is necessary to have a regulatory "backbone", possibly delivered through the Certificate of Approval process.

² Sewage treatment plants currently operate under Certificates of Approval, with effluent criteria included. Those criteria are designed to capture the principal constituents in municipal wastewaters, but do not include all or even most chemicals commonly used in industry.

Recommendation 1: *We recommend that the Ministry pursue the development of regulatory requirements for pollution prevention, either through standalone legislation or by amending the Ontario Environmental Protection Act to extend the authority to write regulations that apply to all stages of a product or substance life cycle.*

We recognize that this recommendation has implications for the Ministry's approvals and enforcement systems, in that it may require a shift toward an enhanced technical support function, and a less adversarial, more collaborative relationship with dischargers than is currently the case.

A recurring theme of our work is the need for transparency and accountability in the prevention and management of spills. To that end, it is our view that pollution prevention plans should be accessible to the public, insofar as that is possible given the presence of proprietary information.

Spill Prevention

Although we believe that pollution prevention is an essential component of any modern environmental management framework, we recognize that it will take some time to phase in less polluting products and processes. In the interim, it will be important to reduce or eliminate the potential for spills. Based on our brief investigation, we believe that the technology and associated practices for spill prevention are well understood, although perhaps not universally employed. Stormwater containment, sewer separation, and effective preventive maintenance programs in particular are widely considered critical elements of any spill prevention plan.

Recommendation 2: *We recommend that the Ministry pursue the development of regulatory requirements for spill prevention plans, perhaps as a condition of Certificates of Approval.*

We recommend that spill prevention plans also be made available to the public, to the extent possible given the presence of proprietary information.

We note that many jurisdictions require a higher level of performance for new ("green field") facilities and for new developments on existing sites, and believe that the Ministry should adopt such an

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approach³, for any new process or facility. The rationale for such requirements is that it is less expensive to design and build preventive systems from the ground up, than it is to retrofit existing systems with pollution prevention/control technology.

Recommendation 3: *We recommend that the Ministry explore the possibility of introducing the most stringent air, water, and waste emission standards possible for “green field” sites and for new developments on existing sites, including additional integrated development of existing facilities.*

We were advised that some recent spills were caused by overflows from stormwater containment facilities. We were therefore concerned that an existing provision for stormwater management plans under Clean Water regulations may not in fact be adequate to control spills related to stormwater containment and release. We suspect that existing plans and associated engineering designs are based primarily on routine rather than extreme meteorological conditions. Although most stormwater facilities in the area are designed to accommodate the 25-year storm, and some even the 100-year storm – certainly acceptable capacity in the past – this may not be sufficient to handle the size and number of extreme events expected in the future under climate change scenarios.

Recommendation 4: *We recommend that the Ministry investigate the current status of stormwater management planning under the Clean Water regulations to ensure that existing plans are adequate to address current and projected extreme events under climate change scenarios.*

Finally, we saw only limited evidence of multistakeholder⁴ planning for “fail-safe” design or extreme events such as the extended power blackout that occurred in August 2003 or the heavy rainfall events that caused spills of stormwater in April and May 2004. **We were particularly concerned about the apparent absence of multistakeholder planning for operations under projected climate change, catastrophic natural events, or terrorism.** In our view, multistakeholder planning, including participatory “performance-based”

³ We believe that zero effluent discharge may be feasible in some cases, and encourage the Ministry to explore this option with industry as proposals for new and retrofitted developments come forward.

⁴ We understand that most facilities currently engage in planning for extreme events, including terrorist attacks, and that such planning may in fact be mandated by insurance requirements. However we saw very little evidence that emergency response planning and simulations involve local residents, municipal services, or governments, even though those parties would be critical participants in a real-life situation.

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simulations of extreme events, is an important part of a preventive environmental management framework.

Recommendation 5: *We recommend that the Ministry and industry begin immediately to develop multistakeholder planning for operations under projected climate change, catastrophic natural events, or terrorism.*

Finding 2: *Current approaches to managing spills are not sufficiently risk-based*

Although we believe that pollution prevention and spills prevention should be central to Ontario's environmental management framework, we acknowledge that it may take some time to achieve those goals. In the meantime, the Ministry's approvals, inspection, and enforcement functions will continue to be critical in anticipating and reacting to pollution events.

The current Ontario system is rooted in public health legislation of the 19th Century, a time when inspectors could limit their focus to a handful of environmental parameters. Today, tens of thousands of chemicals are in routine production and use, and our knowledge of the toxic properties of physical, chemical, and biological pollutants is far greater than it was a hundred years ago. We are, in other words, now in a position to differentiate our environmental management strategies depending on the human and ecosystem health risks of specific parameters and processes. Yet we saw no evidence of a comprehensive "risk-based" approach in Ontario environmental legislation, approvals, or enforcement. **Indeed, the ongoing spill management problem in the St. Clair River region suggests that there are significant gaps in the Province's current framework for environmental protection. These gaps include an absence of risk-based approaches in many aspects of target-setting, approvals, and enforcement.** We wonder if the time has come to consider a more comprehensive risk-based approach.

By "risk-based", we mean a comprehensive system addressing all major factors that affect the probability of adverse impacts on human or ecosystem health. Such a system should be receptor-, chemical-, and environmental medium-specific. In our view, human health protection should take precedence over ecosystem protection, and therefore decisions about acceptable risk must involve affected communities. In cases where the objective for protection of aquatic life is more stringent than that for human health, the more stringent requirement should be the rule. We reject the notion that economic achievability should be a component of risk assessment.

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At the root of spills prevention, response, and mitigation is the definition of a "spill". While the word "spill" under the Spills Bill (Part X of the Environmental Protection Act)⁵, it is ambiguous and does not appear to be risk-based (that is, receptor-, chemical-, and environmental medium-specific). We suspect that in considering a risk-based system for spills management, the Ministry will have to revisit these definitions with a view to clarifying them for both water and air emissions.

Ideally, the priority of the Ministry's approvals, inspection, and enforcement activities should be determined based on the risk to people and the ecosystem in a specific region. The number of spills – currently a commonly used indicator of spill phenomena in the St. Clair River area – is not necessarily the best predictor of the real or perceived threat to human and ecosystem health. We were unable to find information about trends in the volume or toxicity of spills to air or water, or indeed the materials spilled to the St. Clair River or airshed. Yet we believe those considerations, which constitute the risk of the spills, to be as or more important than simple spill frequency.

Notwithstanding these comments, we are aware of a number of risk-based activities within the Ministry, for instance Provincial Water Quality Objectives and Drinking Water Quality Standards that are based on toxicological data. We also understand that Environmental Emergency Response Personnel callout procedures are based on three levels of spill or emergency response. However we saw little evidence of risk-based planning explicitly focused on the prevention and management of spills. Rather, we observed a system that is quite simply "spread too thin", trying to address virtually all spills, of virtually all materials, from virtually all facilities, under virtually all circumstances.

We believe that a more focused, strategic approach is possible, and that it would be possible to differentiate spill prevention, response, and mitigation requirements based on the nature of the materials in use and the nature of the receiving environment. Many jurisdictions elsewhere in the world (the European Union is one example) have adopted prioritized lists of pollutants, and have used those lists as a basis for developing

⁵ Part X of the Environmental Protection Act defines a "spill", when used with reference to a pollutant, as a discharge,

- (a) into the natural environment,
- (b) from or out of a structure, vehicle or other container, and
- (c) that is abnormal in quality or quantity in light of all the circumstances of the discharge,

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differential pollution prevention, spills prevention, spills contingency, mitigation, and notification requirements. Some jurisdictions also differentiate regulatory requirements and technical support resources based on facility size or production level. Within Canada, the priority chemical list for the National Pollutant Release Inventory could serve as a starting place for risk evaluation. Although accurately quantifying the impact of a routine or accidental release of a chemical substance is still a very challenging task, there are many mathematical models (the fugacity model is one example) that can be used to predict the behaviour of organic and inorganic pollutants in a specific multi-phase ecosystem such as the Chemical Valley.

Recommendation 6: *We recommend that the Ministry consider adopting a comprehensive risk-based approach for classifying, preventing and managing spills in Ontario, including creation of unambiguous definitions of spills to air and water.*

A risk-based approach for classifying, preventing, and managing spills will require an a priori assessment of risk. We believe that the onus for evaluating the potential effects of routine and accidental (spills) releases to air and water should rest with the industry, not the Ministry, although the Ministry should be responsible for confirming the adequacy of any such analysis. Furthermore, risk assessment should include not only evaluation of the threshold level of impact on humans or environment, but also a series of predictive assessments that vary by spill intensity, volume, and toxicity over a range of operating conditions, including climate change scenarios. Such assessments could employ computer simulation based on real or realistic environmental conditions and predicted pollutant loading scenarios. We envision a tiered pre-evaluation of each possible spill situation from routine, small volume spills up to catastrophic events. Such an evaluation is, in our view, fundamental to the development of an effective risk-based regulatory system.

In this context, we also raise the question of the form of limits. We are concerned about the potential for cumulative impacts from multiple sources and mixtures of chemicals, which are not addressed by current concentration- or load-based limits. We wonder in particular about the potential for a "bubble" approach for a given facility, placing limits on the total emissions to all media of a given contaminant, or indeed all contaminants, arising from that facility or the Chemical Valley region as a whole. We understand that in the past the Ministry has explored such an approach, and believe that it may warrant further consideration in the current context.

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If the Ministry were to initiate a comprehensive risk-based approach to pollution prevention and spills prevention in Ontario, that process could also provide a long-term framework for recalling and consolidating Certificates of Approval. We could envision, for example, a regulatory requirement that each discharger prepare an application for a consolidated permit, citing the environmental risks of each process component and the materials it uses and releases. The application should, as recommended above, incorporate pollution prevention plans, spill prevention plans, and spill contingency plans. In our view, the application process could require review by a third party quality assurance agency, with a final audit (rather than a detailed review) by the Ministry.

We believe that spill contingency planning and associated notification processes should also be risk-based, and developed in consultation with affected communities. We feel that there is benefit in developing differential spill responses based on the volume and toxicity of the spill and the compliance record of the discharger. We acknowledge that the Spills Action Centre currently maintains a system of non-standard procedures that allow MOE staff to identify high-risk situations and specify responses tailored to them. However, we believe there may be potential for a formalized system of tiered penalties, along the lines of "misdemeanor" and "felony" offences, with ticket penalties for minor offences and in-depth investigation and enforcement for major offences. (Such an approach must however be carefully evaluated; we are concerned that a "ticket" system used inappropriately could in fact trivialize serious offences.) Major offences could force a recall of the Certificate of Approval and an immediate order to correct the problem⁶.

We would support the inclusion of public input and outside expert input into this process of identifying high-risk facilities and operations. We could even envision placement of a Ministry representative on-site, at cost to the discharger, in high risk or poor compliance situations. We understand that there are precedents for this kind of provision in existing Certificates of Approval.

Recommendation 7: *We recommend that the Ministry investigate the potential of a comprehensive risk-based approach to spills response, including a tiered enforcement strategy employing tickets*

⁶ Currently, we understand that the Ministry can issue orders quickly in response to serious situations like spills. In some cases, those situations may also be offences under environmental legislation, and in such cases the Ministry has the power to revoke an approval where a serious offence has been committed. The Environmental Review Tribunal and the courts have provided guidance as to where this would be an appropriate response and the procedures necessary to accomplish this.

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for minor offences, and more in-depth investigation and enforcement action for major offences.

As a further incentive, and a means of focusing limited resources on the most serious problems, the Ministry might consider differential inspection and investigation strategies based on dischargers' compliance records⁷. We believe that dischargers with poor compliance records should be treated differently than "good actors", and could for instance be subject to more frequent site inspections and required to provide financial assurance against future performance. Those with excellent compliance records could be granted reduced inspection frequency and lower penalties, allowing the Ministry to direct scarce resources to the highest-risk dischargers. We heard evidence from industry that peer pressure can be an effective mechanism in improving environmental performance, and we understand that the Ministry is exploring recognition programs for facilities with good compliance records. Although we generally support this notion, we would want assurance that an industry or facility held out as a model citizen does in fact discharge less pollution from all sources than other facilities. We suspect that it may be difficult to select candidate facilities for such recognition, and recommend peer (industrial) and public scrutiny of any such program.

Recommendation 8: *We recommend that the Ministry investigate the potential for creating a tiered enforcement program based on dischargers' spills and general compliance records.*

Finding 3: Ontario's approvals framework is cumbersome and outdated

Ontario's Environmental Protection Act (1972) and Ontario Water Resources Act (1965) both speak to prevention of adverse environmental effect, and in essence therefore provide an implicit statement that good environmental quality guides the approval process. However those statutes do not – and perhaps should not – explicitly stipulate an ideal environmental condition in terms of human or ecosystem health benchmarks; rather, that condition is implicit in guidelines and standards for particular indicator pollutants.

At present, the Ministry uses a Certificate of Approval system to set site-specific discharge conditions for each discharger. In our view, this

⁷ We understand that the Ministry's current policies in fact provide for flexibility in enforcement practice. In this section we are recommending *formalizing* risk-based practices to ensure full transparency and accountability.

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arrangement is increasingly problematic for effective environmental management.

Originally, Certificates of Approval were intended to operate like building permits, granting approval to operate specific machinery rather than to achieve a desired environmental condition. Beginning in the mid-1980s, the Ministry began to attach conditions to its Certificates of Approvals, and with time those conditions, which range from emissions limits to reporting requirements, have become a central part of the Province's environmental management framework. A set of guidance criteria now guides approvals for a wide range of industrial applications. Since Certificates of Approval are granted for the life of a process or piece of equipment (provided it remains unaltered), it is difficult to update older Certificates to add conditions like emissions limits, and the challenge of updating conditions once entrenched in a C of A has proven almost intractable.

In his second report on the Walkerton contaminated water tragedy, Justice O'Connor noted the following in respect of drinking water approvals in Ontario:

Partly as a result of their evolutionary development, the current state of Certificates of Approval is extremely confusing. For example, some certificates have conditions, some do not. They are a strange hybrid of building permit and operating licence, and a single treatment and distribution system can have tens and even hundreds of Certificates of Approval attached to it. In addition, as noted in the Part 1 report of this Inquiry, it is difficult for MOE staff, let alone the public, to access much of the information related to Certificates of Approval.

Justice O'Connor's observations are consistent with our own. We observed that the existing approvals system for wastewater and air emissions is outdated, unwieldy, time-consuming, and resource-intensive, and thus limits the Ministry's ability to keep pace with changing technology and the changing needs of communities and industry.

Although Certificates of Approval for municipal water treatment plants must now be renewed every three years, the same is not true of wastewater treatment systems or air emissions. Justice O'Connor further notes that these issues were identified years earlier in the 1992 report of the provincial government's Sewage and Water Inspection Program (SWIP), and the March 2000 report of the Provincial Auditor. Those reports found that the Ministry did not have an adequate system for reviewing the conditions of existing Certificates of Approval in order to ensure that they meet current environmental standards. The SWIP report proposed either the enactment of a legally binding regulation regarding the

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operation of sewage and water treatment facilities, or the issuance of a new, consolidated Certificate of Approval to every facility.

We heard evidence that large industrial facilities may have dozens or even hundreds of Certificates of Approval for air emissions, and a similar number for water discharges. We believe that this system, although well-intentioned, is increasingly cumbersome and difficult to track and update. This may be where a "bubble" approach is most valid. We understand that only a small proportion of the Ministry's Certificates of Approval are actually available in searchable electronic format; the remainder are in hard copy form. As opportunities present themselves, and sometimes as a result of SWAT inspections, the Ministry is gradually recalling these permits, reviewing them, and re-issuing them in consolidated, updated, searchable form. We applaud this action and hope that as the Ministry pursues initiatives to reduce or eliminate spills, it will increase its activity in this area. It might, for instance, be possible to create incentives for dischargers to prepare and submit applications for consolidated permits. We understand that in any case new source protection planning legislation will require review and consolidation of Certificates of Approval. We observe that a regulatory requirement for consolidation might be preferable to Director's orders in that it would avoid costly and time-consuming appeals to the Environmental Review Tribunal.

Although Ministry staff assured us that industry in the Chemical Valley was largely in compliance with applicable legislation, it was apparent to us that there was very little incentive for the industry to move beyond regulatory requirements and the best available technology (BAT) they imply. In the case of the Clean Water regulations, BAT was last evaluated in the 1980s and early 1990s and may now be significantly out of date. As reflected in the report of the Ministry's MISA Issues Resolution Process (1990), the Ministry always intended that BAT would be reviewed on a five-year cycle. Such a review has not to our knowledge occurred, so we are in effect asking industries to comply with regulations that are almost 20 years out of date. **It is our view that regulatory limits should be reviewed and revised, sector by sector, on a rolling five-year cycle.** The issue, in other words, is not a need to streamline the approvals process. Rather, it is that an unnecessarily complex and resource-intensive approvals process consumes resources that could perhaps better be directed to regular review and updating of regulatory limits.

As evidence of this, we found a number of examples of outdated or inappropriate technology in the Chemical Valley, including:

- ☐ ***Once-through cooling water systems used without automatic diversion or secondary containment.*** Many

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stakeholders, in industry, government, and in the communities, expressed deep concern about continued use, and even renewed approvals, of once-through cooling water systems in unit processes where there is a high risk of environmental impact without automatic diversion or secondary containment. These approaches were identified as obsolete in the MISA studies of more than 15 years ago. These systems have a high potential for failure and associated detrimental impacts on downstream people and ecosystems unless they are separated from the environment by multiple barriers.

- ❑ ***Hydrocarbon pressure safety release valves that disperse hydrocarbons directly into the atmosphere without flaring.*** These arrangements allow discharges to the atmosphere during any over-pressure failure or upset of operations. In other parts of the country, we understand that there is a regulatory requirement that such emissions be vented to a flare stack.
- ❑ ***Insufficient emergency power sources at high risk locations.*** While we observed the presence of backup generators at a number of locations, some emergency power supplies appeared inadequate to accommodate power outages of more than a few hours. The August 2003 blackout was a significant cause of upset conditions, in part because of the lack of a continuous supply of emergency power.

We understand that it is a daunting prospect to recall and reissue Certificates of Approval simply to update limits. But by granting approvals for the lifetime of a given process (provided it remains unaltered), the Ministry provides no incentive for reduction of discharges or associated infrastructure beyond compliance levels that may be seriously out of date. Under the principle of regular review and continuous improvement, we believe that dischargers should be updating equipment as technology and societal expectations evolve. The Ministry's current approvals system does not require or encourage this. Long time gaps between infrastructure upgrades may in fact discourage change, in that although the changes they imply are less frequent, they are often far more costly than regular incremental improvements. And although we support the notion of time-limited Certificates of Approval, we observe that time limits might not be necessary if the Ministry ensured that emissions limits were regularly reviewed and updated.

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We also found that the Ministry's current approval process is heavily focused on detailed evaluation of proposed equipment, to ensure that it can achieve the expected level of control and that good engineering practices have been applied. This places the Ministry in a difficult enforcement position, should the approved equipment prove inadequate to achieve regulatory limits. It also diverts staff from a non-punitive technical support and advisory role, which may in the long term be most useful in preventing pollution and spills in general.

The Ministry's current approvals system also requires considerable in-house expertise that is both costly to maintain and quickly made obsolete without extensive staff training/retraining. In our view, the Ministry's limited human and fiscal resources would be more usefully directed to regular review, revision, and enforcement of discharge limits, leaving dischargers to achieve those limits in any way they choose. We note that such approaches are common, indeed typical, of many environmentally progressive jurisdictions elsewhere in world.

In this context, we must emphasize the Ministry's central and critical role in audit and enforcement on behalf of the Ontario public. We do not see that role as including engineering design or approval, which is properly the responsibility of dischargers.

In short, we believe that the evolution of the Certificate of Approval system, from a building permit structure to an emissions compliance framework, has in fact created two parallel enforcement regimes. One regime sets and enforces discharge limits at the end of the pipe; the other approves and enforces the sizing, design, and building of structures. Of the two, the latter, which requires extensive in-house engineering capability, may be the most time-consuming and resource-intensive. Yet it is the first – the establishment and enforcement of limits – that in our view is really the principal responsibility of the Ministry on behalf of the citizens of Ontario.

In our view, the Ministry has three central duties:

1. **To set targets for environmental quality:** To develop, in consultation with Ontarions, a vision of a desired environmental condition, and to choose indicator parameters and set discharge associated discharge limits that will result in progress toward the shared vision.
2. **To ensure that limits are met:** To monitor air and water emissions from industrial and municipal facilities, and to

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audit self-monitoring programs, to ensure that discharges to air and water meet regulated limits.

3. **To ensure that limits are adequate:** To regularly and thoroughly monitor ambient environmental quality to determine if progress is being made toward the common vision of desired environmental quality. If ambient conditions are not improving or are deteriorating, the Ministry has a responsibility to review and revise indicator parameters and associated regulatory limits accordingly.

By focusing a large proportion of time and money on an unnecessarily complex approvals system, the Ministry may in our view be neglecting some of these duties, especially the development of a shared vision of environmental quality (#1), adequate monitoring of ambient environmental conditions (#3), and regular review of discharge limits (#1). These points are discussed in more detail under subsequent sections of this report.

It seemed to us that the current approvals system in fact hamstrings the Ministry's ability to focus its scarce resources on the most critical problems and facilities. We found only very limited evidence of a risk- or impact-based approach to approvals, enforcement, and technical support. Current systems appear to treat management of relatively innocuous materials and infrastructure equally, and do not differentiate between large and small dischargers or between those with excellent compliance records and those with multiple infractions. Detailed review of minor technologies with low pollution potential (e.g., water pumps) is in our view a waste of Ministry time and resources. If the Ministry believes that it is essential to retain approval of specific pollution abatement technology (a view we do not necessarily share), we would prefer to see a streamlined approvals process for these minor approvals, perhaps even a "permit-by-rule" system with standardized approvals for a specified list of technologies. We recognize that changes to the existing system could require amendment of the Ontario Environmental Protection Act and Ontario Water Resources Act. However we see nothing in Section 9 of the Environmental Protection Act, or Section 53 of the Ontario Water Resources Act, both of which deal with Certificates of Approval, that would preclude introduction of a tiered or risk-based approvals process.

To summarize, we believe that there are significant opportunities for reworking the Ministry's approvals and enforcement functions, to encourage a more streamlined, less adversarial system. We understand that the Ministry has taken some steps in this direction, for instance to establish a dedicated Streamlined Review Unit to process approvals for

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applications deemed to have less potential for significant environmental impact. We applaud those efforts, but believe the problem is more significant than administrative procedures. We believe that the Ministry has an important responsibility to audit the performance of individual facilities and confirm the results of industrial self-reporting. At the same time, we are cognizant of the significant staff implications of a comprehensive audit system. We recommend that the Ministry explore the potential for using third party audits by established quality management firms and ISO 9000/14000 registrars such as QMS or AQSR, which are experienced in facility and process audits. **In our view, the onus for selecting and implementing technology should rest with the discharger, with the discharger fully accountable to the Ministry and the public for those decisions.** Third-party auditors with sector-specific expertise could also be used to provide a pre-application assessment of a facility's main technical issues.

We also encourage the Ministry in cooperation with local industry to explore opportunities and incentives for peer-to-peer technical support, delivered not only within the industrial community but also in a more public way, such as on a web site.

Recommendation 9: *We recommend that the Ministry review and consider significant revisions to its existing approvals and enforcement regime, to ensure that it accommodates regular review and revision of discharge limits, based on comprehensive assessment of ambient environmental quality, while maintaining an adequate audit and enforcement function on behalf of the people of Ontario.*

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Recommendation 10: *We recommend that the Ministry explore mechanisms for periodic review and revision of regulatory limits for air, water and waste emissions, preferably on a five-year rolling cycle, including the form of limits and the penalties for noncompliance, to ensure that they are sufficiently protective of environmental systems while recognizing the inherent variability of industrial processes and discharges .*

Recommendation 11: *We recommend that the Ministry work with dischargers to determine the need for and level of multiple barriers separating high-risk technologies like once-through cooling water systems from receiving waters, and develop associated regulatory requirements.*

Finally, we were intrigued by the potential for communal storage and treatment of stormwater and water effluents, which could afford not only economies of scale but also improved treatment efficiency. We understand that industries in the Chemical Valley have begun to explore these options and trust that these discussions will continue and bear fruit. Elsewhere in the world, communal treatment facilities are operated as standalone utilities with separate operating permits; such an approach might be feasible in the Chemical Valley.

Recommendation 12: *We recommend that industries in the Chemical Valley explore the potential for communal storage and treatment of stormwater and other water effluents designed to accommodate predicted storm intensities under climate change scenarios.*

Finding 4: *The Ministry's current environmental management system does not employ the full range of available tools*

We heard evidence from industry expressing frustration about existing economic incentive programs, which are almost entirely geared to granting tax exemptions for "bolt-on", end-of-pipe pollution control technology, without similar exemptions for more protective pollution prevention approaches. Canada is well behind other jurisdictions that have made effective use of economic incentives to encourage dischargers to go beyond compliance levels. A recent OECD survey showed that Canada was one of only a handful of member countries without such approaches in their environmental management toolkits. We were unable to review the environmental achievements of other nations, but anecdotal advice suggests that countries with a reputation for environmental stewardship, such as Denmark, Sweden, and Germany, currently employ other approaches than are currently in use in Ontario. In our view, it

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would be worth examining these alternatives. Ontario's current system specifies benchmarks and punishes offenders, but may not provide sufficient positive incentives to go beyond compliance levels:

- ☐ Fines are not a sufficient deterrent, possibly because the amounts are too low and may be perceived as simply the "cost of doing business"
- ☐ Existing voluntary pollution prevention opportunities are limited and there is little or no incentive to participate in them.
- ☐ Many economic incentive models are in use elsewhere in the world, and could be adapted for use in Ontario.

In addition to traditional fines and jail sentences as penalties for non-compliance, we believe that the Ministry should also consider implementing a range of economic instruments such as taxes on certain feedstocks or raw materials; grants, low-rate loans, and accelerated depreciation programs for pollution prevention, possibly geared to a required level of performance that is significantly beyond regulated limits (as is the case in much European environmental law). While we believe that dischargers have a responsibility to "do the right thing", we also observe that the current C of A system may actually deter industries from going beyond compliance, particularly when the approach is new or unproven and the risk of failure is high. Industrial representatives advised us that incentives may be particularly important when a facility wishes to attempt a new and riskier approach to pollution prevention. For example, if a facility wishes to redesign a system to avoid the use of benzene, it would likely need to install different equipment and use other kinds of materials than are commonly in use. Economic incentives would encourage such initiatives, whereas the existing C of A system discourages them. Similarly, a well thought-out system of emissions charges could provide an incentive for the development of closed loop systems. We note that some economic incentives are currently available at the federal level, but we were unable to find any evidence of them in provincial regulations or policies.

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Recommendation 13: *We recommend that the Ministry develop a legislative framework that incorporates both “sticks” and “carrots” - economic incentives such as grants, low-rate loans, accelerated depreciation programs, and similar mechanisms – for dischargers who are able to demonstrate a specified level of environmental performance beyond compliance levels.*

Finding 5: *The number and training of staff may be important factors in spill prevention and response*

Ministry staff advised us that human error was a common cause of spills in the St. Clair River. IPAT members believed that this observation was an oversimplification, and suspect that the situation may relate to workforce reductions at many area plants, and an increasing need for workers to “multi-task” to get the job done. We heard concerns that staff are now stretched to the limit just to keep the system running under routine conditions, and may not have the human or technical resources to cope effectively with emergency or catastrophic events. Evidence from recent spill events points to mechanical failure rather than human error as the cause. If this is in fact the case, it will take more than retraining to rectify the problem; staffing levels may also require attention.

We found no requirement for operator or manager training or certification either in regulatory requirements (including Certificates of Approval) or in the industry’s Responsible Care Program requirements. (We do understand that many facilities in the area have extensive training and upgrading programs for their workers and managers; they are not, however, required to do so under law.) These findings prompted several comments and questions for us:

- ☐ Training clearly must be specific to each facility and unit process.
- ☐ Effective training encompasses more than the preparation of new employees. It must also extend to continuous updating and retraining, and “remedial” training following spills or upset events.
- ☐ Training of managers is as important as training of operators, especially for the management of extreme or catastrophic situations.

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- ☐ Even when appropriate training programs are in place, retraining may be required to manage changing conditions, such as those related to climate change.
- ☐ Are facilities over-automated? That is, are there enough people to manage non-routine conditions? As automation increases, operators may be asked to undertake a wider range of tasks, and may be less able to respond to non-routine conditions. There must be sufficient trained staff to operate equipment safely.

According to earlier work conducted by the International Joint Commission, increasing reliance on technology can in some cases actually increase operator error, in that "high tech" systems can create a false sense of security. As industrial systems become increasingly automated, there may actually be a greater need for operator training to ensure that individuals are reminded of their personal responsibility for the operation of technology under routine and extreme conditions. In highly automated systems, there are many fewer operators, and those operators can have a very diverse workload. They are under pressure to keep the unit operating even under upset conditions. In essence, then, human error may be more the consequence of business and management decisions, than an actual error made by an operator. We have no evidence to suggest that this is the case in the Chemical Valley area, however, and indeed automated technology may be increasingly necessary to operate complex facilities safely within tight operating ranges.

In our view, effective training is essentially a matter of enhancing human performance, and should go well beyond basic training in equipment operation. We emphasize the need for performance-based training using realistic example scenarios. In our view, there is immense value in full-scale simulations of catastrophic conditions, involving not only industrial facilities but also surrounding communities. Such simulations would require the cooperation and participation of local health, fire and police authorities, and would in our view be extremely valuable in exposing weaknesses in current response systems. Even routine Workplace Hazardous Materials Information Systems (WHMIS) training could provide affected parties with opportunities for multistakeholder, performance-based experience in recognizing and categorizing spill events, and reacting accordingly.

We believe that effective manager and operator training and certification could reduce the potential for spills, and the seriousness of unavoidable spill events, and improve the response to and mitigation of spills. Justice O'Connor made this point emphatically in his second

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Walkerton report. Such training could extend beyond employment requirements to include mandated re-training for operators and facility managers in the event of all or certain spill events. Justice O'Connor also recommended that the Ministry actively participate in the development of training curricula for operators. In the current context, we feel that the Ministry may well have a responsibility to ensure that current training mechanisms are adequate to achieve the desired ends, both for initial operator certification and for periodic recertification. Included in this training should be a consideration of the need for redundancy in staffing where there is a significant risk of accidental release, explosion, or similar hazard.

We heard evidence from the public and from workers that workers should have whistleblower protection should they choose to report polluting activities to the Ministry. Such protection is already available under environmental legislation, most notably under the Environmental Bill of Rights, but we were surprised to find little awareness of it. Worker rights, including whistleblower protection, and responsibilities under environmental legislation should be a central part of any training and certification program.

Recommendation 14: *We recommend that the Ministry evaluate the effectiveness of current training and certification programs, and consider related conditions under Certificates of Approval and Control Orders. Such training should include performance-based training, mandatory retraining and upgrading, mandatory debriefing and associated retraining following spill events, and must include preparation for both routine and emergency situations.*

Finding 6: *Current Ministry monitoring systems appear inadequate to assess ambient conditions*

As noted above under Finding 3, it is our view that the Ministry has an important responsibility on behalf of the citizens of Ontario to monitor ambient environmental conditions. A statistically valid ambient environmental monitoring program provides an important check against loading limits established through the Clean Water and air pollution regulations. It also helps to distinguish upstream or non-point sources from inputs arising in the vicinity of heavy industrial activity. Monitoring is required at several points between the first creation or use of a substance, and its ultimate impact on environmental systems. Some of these points will be the responsibility of dischargers, while others are in the public domain. We found a lack of clarity, or perhaps simple disagreement, regarding the goals of monitoring programs, particularly those for the ambient environment. What is it that is important for us to know? What

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parameters can we use as indicators? Is there a way to monitor effects directly, not just via concentrations of chemical parameters?

Monitoring networks, both within an industrial facility and in the ambient environment, must be closely tied to the regulatory framework they support. As one member noted, "if you can't measure it, you can't manage it". Without clear goals, it is impossible to design an effective monitoring strategy and associated statistical analyses geared to providing the information necessary to answer the questions of interest to environmental and health managers. For example, systems designed to detect the presence of a substance in ambient air or water may require less data, and therefore fewer monitors, in fewer locations, measured less frequently, than those designed to produce statistically-valid and spatially accurate estimates of ambient concentrations or loads.

Spill monitoring is a complex issue, comprising detection on-site (at a failed valve, for example); at the point of release to a containment facility on-site; at the point of release to natural air or water systems; and more generally in terms of ambient air and water quality and ecosystem health. Effective monitoring of spills and their impacts therefore requires a large and complex network of sensors, monitoring systems, and the staff and laboratory resources to support them. We found that these systems are currently patchy at best, particularly with respect to monitoring of ambient conditions and associated communication of routine and emergency conditions to affected parties. It may be possible to take advantage of new technology to reduce long-term operational (especially staff) costs while improving the volume and quantity of data available for regulators, dischargers and the public.

We saw evidence of continuous monitoring systems within industrial facilities and at the point of discharge, but we were concerned about the paucity of monitors in the ambient environment. We believe that existing Ministry monitoring systems are insufficient in number to provide an accurate, synoptic picture of ambient air and water conditions. Although we know that the purpose of ambient monitoring stations is not primarily to trigger remediation or enforcement action, we heard concerns that local stakeholders rely heavily on data from those stations to provide feedback on local environmental quality, and it is our belief that they are insufficient for that purpose. We know that SLEA maintains a single monitoring station in the river, and that that system routinely assays for a range of environmental contaminants. **However we believe that the principal responsibility for monitoring the ambient environment rests with the Ministry, not the industry or the communities.**

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Although our limited time frame did not permit a detailed review of existing monitoring and reporting systems, it was our perception that neither industry nor MOE is taking sufficient advantage of available monitoring technology that would allow continuous monitoring of a wide range of high-risk contaminants in situ at low cost. The proposed Great Lakes Observing System has demonstrated not only the existence but the cost-effectiveness of such monitors for a wide range of pollutants, and their potential for data-sharing across sectors and jurisdictions. We note however that the selection of an appropriate sensor must in itself be risk-based and tailored to the particular parameters under study. In addition, we acknowledge that the detection limits and general quality of data provided by in-situ monitors will not generally be at the same level as analyses conducted in a laboratory. However we believe there is value in a combination of in-situ sensors, providing a continuous stream of data, and periodic field sampling coupled with rigorous laboratory analysis to confirm those results.

In this context, we feel it is important to emphasize community concern about ambient environmental quality. We believe that it is essential that citizens be involved in discussions about an appropriate level of monitoring and reporting for the St. Clair River ecosystem. The public needs ready access to high quality information – not simply raw data – about the quality of their environment. Whereas monitoring at the end of the pipe is intended as a check on the approvals mechanism, ambient environmental monitoring provides feedback on whether approved emissions are achieving acceptable results in humans and local ecosystems – whether the ambient environment is approaching a desired condition. **As such, it is clearly a Ministry of the Environment responsibility.** We saw only minimal evidence of direct monitoring of environmental quality (sometimes termed "environmental effects monitoring"), but we believe there is great value in monitoring programs that include not only pollutant concentrations, which imply an effect, but also biomonitors, which provide a direct measure of the impact of multiple substances and pathways on biological systems.

Recommendation 15: *We recommend that the Ministry in collaboration with industry and the communities review the goals of point-of-release and ambient environmental monitoring programs and reevaluate the effectiveness of existing monitoring networks for achieving those goals with the most appropriate division of responsibility.*

We found that continuous automated monitoring systems are widely used for process control and monitoring within industrial facilities and in many cases at the point of discharge to the environment. However,

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the same cannot be said of the Ministry's network of ambient monitoring stations, where we found little or no evidence of such approaches. We were pleased to learn that the Ministry is investigating emerging technology for continuous in-situ monitoring of ambient conditions for trace organic substances, for instance using membrane introduction (or inlet) mass spectrometry (MIMS). We encourage this initiative and suggest that it might provide opportunities for collaboration not only with industry but with other government agencies, particularly Environment Canada, US EPA, and the Michigan Department of Environmental Conservation.

Recommendation 16: *We recommend that the Ministry in collaboration with industry and the communities evaluate the potential for financing and use of state-of-the-science in situ sensors to provide a continuous feed of high quality data to operators and regulators.*

Finding 7: *Laboratory analysis is slow and hampers spills response*

A recurring theme in our work was the lack of adequate laboratory analytical facilities in the Chemical Valley area. Although local laboratories exist, for instance within individual industrial facilities, they are not equipped for the full range of analytical needs required by the Ministry, nor are they certified by the Ministry's Laboratory Services Branch.

We found this lack of local laboratory capacity surprising given the high concentration of industry in the area, but indeed there is currently no Ministry of the Environment laboratory for chemical analysis located closer than Toronto (Rexdale). We understand that it is a costly business to develop a fully-equipped regional laboratory, but we believe there is huge value in such a facility. An example will illustrate this point.

In January 2004, a spill of methyl ethyl ketone (MEK) caused considerable alarm among downstream communities. The Walpole Island community was told that the Ministry's computer simulations predicted a given plume time of travel and associated intake concentrations, and that those phenomena would not be affected by ice in the river. Nevertheless nervous about the security of water supplies, then-Chief Day insisted that the plume be tested and that MEK concentrations be below detection limits before the water intake was reopened. The community experienced long delays and considerable worry and uncertainty while they waited for laboratory analytical results to be returned. When those results were eventually available, the community learned that whereas the Ministry's simulations had predicted a plume travel time of hours, in fact the

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laboratory analyses revealed that it was almost three days before intake concentrations of MEK returned to non-detect levels.

Whether the Ministry agreed with the Walpole Island Chief's position is not the point. From the communities' perspective, there is a need to get on the site of a spill immediately, collect samples, and receive analytical results within hours. Timely response not only allows good decisions to be made promptly; it also reduces the stress associated with uncertain environmental – especially drinking water and ambient air – conditions. Currently this process takes days – an unacceptable delay from the public's point of view.

We believe that the Ministry's laboratory analytical support for the spills detection/response process should be significantly improved. There are various ways to accomplish this goal, for instance by establishing a Ministry of the Environment satellite laboratory in the Sarnia area; by contracting with a commercial laboratory in the region; or by facilitating transport of samples to and from the Ministry's central laboratory in Toronto. Our preference is for a standalone Ministry laboratory in the Sarnia area, which currently has no MOE-certified drinking water testing laboratories. Although contracting with a local laboratory is possible, it may not be the best solution. We are conscious of the potential for conflict of interest when a private laboratory undertakes work both for regulated industries (process and discharge monitoring samples) and on behalf of the Ministry itself (ambient monitoring samples). And to us, an improved car or bus "shuttle" service to and from Toronto is at best a temporary solution and inherently unreliable given uncertain traffic and weather conditions. Helicopter shuttle would be little better. In our view it is critical to reduce the turnaround time between sample collection and receipt of results.

We know that Ministry staff share our concern about this issue and are exploring alternatives, including expedited transport of samples to the Ministry's Rexdale laboratory. In our view this is only a "bandaid" solution to a serious problem. Especially because of the high concentration of industry in the region, we believe the Ministry must begin to establish not only laboratory analytical capacity (and analytical methods appropriate for the parameters likely to occur) but also adequate sampling capability (including appropriate boats, sampling equipment and trained staff). These resources, available in the Chemical Valley area and tailored to its needs, would ensure that appropriate instrumentation, analytical methodologies and trained staff are in place to monitor for high risk chemicals during routine monitoring, and during and after spill events. Appropriate laboratory facilities could be established either as a new standalone operation or in cooperation with an existing commercial

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laboratory in the area. The costs of such a facility could be offset by cost-sharing with industry, and fee-for-service analysis for local laboratories, municipalities, the Ministry of Health and similar agencies, and even neighbouring jurisdictions.

Recommendation 17: *We recommend that the Ministry explore opportunities for establishing analytical capability in or near Sarnia, to reduce turnaround time for laboratory analysis and improve the Ministry's ability to monitor and respond to spills and their impacts.*

Finding 8: *There is no regulatory requirement for laboratory accreditation in industrial self-monitoring*

Whatever approach the Ministry takes to provide laboratory analytical capability for the Chemical Valley, we believe that industrial self-monitoring and associated reporting will continue to be an important part of routine compliance monitoring. For such a system to be effective, it is important that laboratories at industrial facilities are reputable and their results unimpeachable.

Two issues emerge: *accreditation* of laboratories to ensure that they use best practices and produce high quality, reproducible results; and recognition (*certification*) of accredited laboratories by the Ministry of the Environment. Both types of control are important for spill management in the St. Clair River area. Laboratory accreditation is important for industrial self-monitoring, to demonstrate that a discharger is using reputable laboratory facilities for its analysis. Accreditation means that the laboratory's facilities and operating procedures are regularly reviewed by an independent third party to ensure reproducible analytical results and adequate quality assurance and quality control. When a discharger submits results from an accredited laboratory, the Ministry and the public have some assurance that the analyses have been properly and rigorously conducted. In other words, only results from accredited laboratories can be considered valid.

We found no regulatory requirement for laboratory accreditation or indeed any quality control/quality assurance in industrial self-monitoring and compliance reporting. It seems to us that such controls are important in a system that relies heavily on self-reporting. We note that the recently-enacted Safe Drinking Water Act requires both laboratory accreditation through the Standards Council of Canada (working with the Canadian Association for Environmental Analytical Laboratories) and certification by MOE's Laboratory Services Branch. There is however no parallel requirement for accreditation of laboratories testing wastewaters, ambient

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waters, or air emissions under either the Environmental Protection Act or the Ontario Water Resources Act.

Recommendation 18: *We recommend that the Ministry impose regulatory requirements for accreditation of private laboratories used in industrial self-monitoring and associated reporting. The results of laboratory accreditation exercises should be transparent to the public, for instance on a web site.*

Laboratory certification (licensing), by contrast, essentially certifies that a laboratory is equivalent to or as good as the Ministry's own laboratory for specific analyses. Certification is important in distributing the Ministry's analytical workload to laboratories other than its own. A laboratory might be accredited by the Standards Council of Canada, but for some reason be otherwise unacceptable to the Ministry of the Environment. A Ministry-certified (and accredited) laboratory in the Sarnia area would greatly reduce the need to transport samples to Toronto for analysis during and after a spill event.

Here again the January 2004 spill of MEK provides a useful example. No local laboratory – other than the at-fault facility – had the capacity to analyze for MEK and associated parameters. The long analytical delays in this incident point to the need not only for a local Ministry of the Environment laboratory, but also for "redundant" analytical capacity – through MOE certification – in local private laboratories. In fact, the facility responsible for the spill had the necessary analytical capacity, but because it was not certified by the Ministry it could not be used during the spill event. In hindsight, we wonder therefore whether it might have been sufficient to bring a Ministry analyst to that laboratory to scrutinize procedures as an auditor – in effect, to grant temporary certification – throughout the spill incident, so that results could have been available more quickly.

Recommendation 19: *We recommend that the Ministry consider options for MOE certification of accredited private laboratories engaged in analysis of routine and emergency ambient monitoring samples.*

Finding 9: Spill contingency plans are not transparent to the public

We understand that spill contingency plans can be and often are required under existing legislation, usually as part of Certificates of Approval. The Chemical Valley plants are however complex, each having numerous unit process operations. Furthermore, the precise combination

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of unit processes can differ significantly from one plant to the next, depending on the products manufactured and the processes used to make them. As a result, spill contingency plans are necessarily tailored to individual unit processes, and may be dispersed throughout a facility. To put this another way, few facilities have a single spill contingency plan. Rather, they have individual spill contingency plans for each operation or unit process, often housed with that operation or process. Although our short time frame did not allow us to conduct an in-depth investigation of the causes and responses to specific spill incidents, it was our impression that most or all facilities do have spill contingency plans in place. The recent spills do however suggest that existing spill contingency plans may not be as effective as they could be. For example, we note that some plans are housed only on computers, and may therefore be inaccessible in the event of an extended power failure. Ministry staff advised us that they have not developed guidance for the development and review of spill contingency plans, for use by industry. However such guidance could certainly be available through arm's length consultants or professional ISO auditors.

Recommendation 20: *We recommend that the Ministry require review and revision of a facility's spill contingency plans following a spill event.*

It was also our perception that the public are confused about the nature and indeed even the existence of spill prevention and spill contingency plans at industrial facilities. We believe that it would be helpful to the communities to have these points clarified on a web site. A simple approach might be to post on the Ministry's web site a table with a list of area industries, indicating whether each has or lacks a pollution prevention plan, a spill prevention plan, and/or a spill contingency plan approved by the Ministry. If associated documents are currently available for public inspection, that fact could be noted with a footnote in table entries, and appropriate links provided.

Recommendation 21: *We recommend that the Ministry in collaboration with industry and the public explore opportunities for public communication about the existence of approved pollution prevention plans, spills prevention plans, and spill contingency plans, placed on the SLEA or Ministry web site to encourage public awareness of the complexity of industrial processes and proposed responses to spills events.*

Finding 10: *Spill response systems should employ state-of-the-art predictive simulation*

We believe that the Ministry's ability to predict and respond to spills events is compromised by a lack of adequate in-house modeling expertise, especially for simulation of aquatic phenomena. Whereas sector-specific engineering expertise in approvals is desirable, it is not essential. The approvals process is relatively routine and predictable in terms of schedule; spills are not. The approvals process can make effective use of independent consulting expertise tailored to the particular sector or process under consideration. By contrast, effective spills planning and response demands rapid and continuous simulation of dispersion and travel times to downstream water intakes and other users, and thus must rely on readily available in-house expertise.

Spills simulations must be adequate to assess impacts locally and regionally, must provide the types of information needed by the Spills Action Centre to make informed decisions and provide public advice, and ultimately must "stand up in court" in the event of a prosecution. The inherent variability of natural air and water systems makes it essential to understand the full range of conditions that may arise in routine and upset conditions. These include not only average or typical conditions (including the river ice experienced during the MEK spill), but also extreme or even catastrophic events. Simulations predict an outcome; laboratory analyses confirm it. Good predictive capability often means use of several different kinds of simulations, each providing a cross-check on the others.

We were surprised not to hear any evidence of multimedia modeling for the Chemical Valley region. Given the number of industries, and the known risk of spills to air and water, we believe that a range of models are essential, including not only separate air and water models but also models that examine the air-water interface and water-biota relationships, including food chains where appropriate. Ecosystems such as the Chemical Valley are multi-phase in nature. Treating air and water separately in modeling cannot adequately simulate the fate, transport and effect of a pollutant in a specific environment. It will likely be necessary to

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tailor the choice of model and the modeled scenarios to particular situations. Careful consideration of the specific geographic area under study, the scenarios to be evaluated, and the questions to be answered with them, should guide the selection of model type and dimensionality (i.e., steady-state, 2-dimensional, 3-dimensional, statistical, etc.) The more limited the Ministry's in-house modeling capacity, the less opportunity there is for internal peer review – and the more likely modeling tools and approaches can be challenged as outdated or otherwise inadequate.

Recommendation 22: *We recommend that the Ministry consider expanding its in-house computer simulation expertise to ensure adequate capability for simulating the behaviour and effects of spills.*

We are aware that SLEA and its member companies have communally invested in dynamic air and water modeling tools for purposes of designating on-site risk management, worker safety, and environmental compliance. These efforts should be encouraged and steps taken to expand the model boundaries to address air quality and impacts to local communities in proximity to the facility. Ideally these results would be communicated to, or simulations developed in conjunction with, the Spills Action Centre to streamline the risk assessment process during a spill. Although accurately quantifying the impact of a routine or accidental release of a chemical substance is still a very challenging task, mathematical models can be helpful in predicting the behaviour of a pollutant in a specific ecosystem such as the Chemical Valley, and can help to determine the priority of enforcement activities by identifying chemicals that are particularly problematic for a specific environmental setting.

Finally, we note that Regulation 346 of the Ontario Environmental Protection Act requires air modeling to predict the dispersion of air emissions. Yet those requirements are, we believe, antiquated in that they focus primarily on the "point of impingement" – essentially, the perimeter of the facility – whereas the impacts of air pollution will certainly extend beyond the facility and may indeed be regional. In addition, the dynamic nature of atmospheric systems and industrial air emissions requires similarly dynamic simulation capability. It is not enough to estimate steady-state (unchanging) conditions or single events, because of the potential for cumulative effects and non-uniform community impacts. We were therefore pleased to hear that the Ministry is now re-examining its regulatory requirements for air modeling, including consideration of the use of Air Mod Prime. We look forward to hearing more about the outcome of those discussions.

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Finding 11: Downstream communities are not recouping the full costs of spills

An important part of spills response is enforcement and prosecution. We are concerned that downstream communities now feel they bear much of the cost of spills response and mitigation, for instance through the purchase of bottled water when drinking water intakes must be closed. Yet these communities receive little of the revenue generated by fines or other fees. We are aware that various legal instruments provide for allocation of real costs, and that in addition there are provisions for a victim surcharge that is less often used. However was is not clear to us that these surcharges, when imposed, are in fact always paid or reach the groups or individuals most affected by the spill event. It is possible, for instance, that when First Nations communities are affected by spills, jurisdictional issues may complicate the transfer of victim surcharges to them. We hope that the Ministry will find a way to work with the judicial system to find ways of resolving these concerns. To do so would in our view create a more reasonable distribution of costs, and a greater disincentive to spills.

Recommendation 23: *We recommend that the Ministry seek ways to institutionalize the delivery of a portion of the fees and fines associated with spills management to the parties that bear the costs of spills, and the NGOs that support them.*

Finding 12: Current notification systems do not serve all water users equally well

We were impressed by the detailed and comprehensive spills notification systems operated by the Ministry and SLEA, yet we were struck by the fact that some water users nevertheless do not feel that they are informed about spills in a timely fashion. In part, this may be because the Ministry has assessed a spill and concluded that its volume or character does not warrant immediate notification of downstream users. For those users, however, that assessment may not be at all clear, and they are left in doubt about whether intake closures are necessary or appropriate. We believe that the current notification systems require review **in consultation with local communities and private water users**, to determine the most appropriate spills notification strategies for different user groups and cultures. It may be necessary to develop different notification strategies for different kinds of spills, and/or separate strategies for spills to air versus water.

We must emphasize the importance of this task. Essentially spills detection and response is a matter of community security and

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associated risk management. The communities must be involved in defining acceptable levels of risk. If existing notification systems are changed, they must not however compromise notification of those who are already notified. The purpose of any change must be to improve the timing and reliability of notification to all affected users, and to involve the community in the decision about whether or not to act on a spill.

Recommendation 24: *We recommend that the Ministry fund local communities to conduct consultations to determine needs and options for the most appropriate spill notification strategies for different user groups and cultures, and for different types of spills.*

We heard evidence that the communities are highly sensitized to spill alerts, and experience a high level of associated stress. At the same time, we are aware of the potential for real hazards to be ignored or dismissed as false alarms. It therefore seemed to us appropriate to explore options for different notification strategies that reflect and accurately report the hazard and urgency of the situation, for instance the size, toxicity, or potential impact of an accidental release. There is a need to take into account potential impacts on communities from all sources and directions, and hazards posed by mixtures of chemicals, not just individual substances. We suggest that the Ministry consult with affected communities to devise appropriate strategies. One idea would be to include a colour-coded level of alert – for example, “code red”, “code orange”, “code yellow” – as a way for the Ministry to categorize spills so that they are easily understood by the public. Such a system would also automatically provide a means of categorizing spill events in annual public and compliance reports.

Recommendation 25: *We recommend that the Ministry investigate the potential for different spill notification requirements depending on the urgency of the situation (e.g., size, toxicity, and potential impact of release), with the intent of providing necessary information, assuring immediate and appropriate response to spill events, and avoiding unnecessary alarm.*

Finding 13: Jurisdictional confusion may be slowing spills response and notification

We note that First Nations communities are effectively federal territories and outside the normal jurisdiction of the provincial Ministry of the Environment. There is no question that jurisdictional complexity complicates the management of environmental conditions, pollution, and spills in First Nations communities. In addition to the provincial Ministry of the Environment, both the federal Department of Indian and Northern

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Affairs and Environment Canada may have a role to play in managing environmental systems on First Nations reserves. It is not perhaps surprising that these jurisdictional arrangements are confusing both to the communities and to the agencies themselves.

We suspect that a lack of jurisdictional clarity may prevent timely and effective response to some environmental crises arising in First Nations communities, for example in the response to recent dumping of hundreds of barrels of styrene wastes at Aamjiwnaang First Nation. Once the call was made to the Spills Action Centre, numerous parties arrived on the scene, including local police, Ministry of Environment staff, and (later) Environment Canada, but there appeared to be confusion about who had jurisdiction to act. The confusion was of considerable concern to the community, which lacked the expertise to respond but felt compelled to begin the cleanup.

We believe that while this kind of situation may be difficult to resolve at a national level, it is relatively straightforward given the small size and close proximity of communities in the Sarnia area.

Recommendation 26: *We recommend that the Ministry, in cooperation with Environment Canada and Indian and Northern Affairs Canada, immediately begin a dialogue with First Nations in Southwestern Ontario to explore legislative and policy solutions for resolving jurisdictional issues to facilitate prompt environmental response and meaningful involvement of the First Nations communities in environmental decision making.*

As discussed in earlier sections, we believe that affected communities must have an active and meaningful role in decision making about the risks that will affect them. Nowhere is this more important than in the First Nations communities, because of their physical location on the river, their tradition of reliance on the land and water for subsistence, and the current jurisdictional confusion. In our view, the Ministry should begin immediately to involve Aamjiwnaang First Nation and Walpole Island First Nation directly and substantively in decisions about spill prevention and response. This involvement should extend to all decisions that affect their well-being, from discussions of acceptable risk levels, through categorization of risks from routine emissions and spills, to spill management, mitigation, and cleanup. To them, and to us, it is fundamentally an issue of respect and inclusivity.

Finally, we learned that the Ontario system of spills detection, classification, reporting, and public notification differs markedly from the Michigan system. In binational waters such as the St. Clair River, it will in

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our view be important to harmonize the two systems as much as possible, or at least to create some administrative bridging structure that allows prompt and effective information sharing between the two jurisdictions.

Recommendation 27: *We recommend that the Ministry work with the Michigan Department of Environmental Quality, US EPA, and Environment Canada to expand the Four Party Letter of Agreement to include a process for harmonizing notification and communication processes on both sides of the St. Clair River.*

Finding 14: Local communities have been gravely impacted by spills

We heard considerable opinion that local communities experience health effects that are more severe, in a greater proportion of the population, than similar communities elsewhere. It was very clear to us that members of the public experience elevated stress and worry about the security of their drinking water supplies given recent spill events, and about the safety of the air they breathe following recent "shelter-in-place" orders. Recognizing the complex set of factors that influence human and ecosystem health in the area, we nevertheless believe that there is a need to compile and evaluate available data to determine (if possible) whether the Sarnia-area communities experience different or higher levels of health effects relative to the rest of Ontario and Canada. We are not aware of any epidemiological studies for this community, although we understand that Health Canada has prepared a series of Health Incidents reports for the Great Lakes Areas of Concern, including the St. Clair River, using hospitalization data and other numbers from Statistics Canada. If such epidemiological data prove difficult to obtain, it might be possible to begin new data collection programs through local medical clinics, for instance logging of every asthma diagnosis and hospital admission with the patient's age and sex.

Regardless of what the data demonstrate, it was clear to us that local communities have experienced a level of psycho-social impact, indeed trauma, related to spills in the Chemical Valley, and that this impact extends beyond the community to the wider region. We were struck by the high level of distrust and suspicion of industry and, to a lesser extent, government, among members of the First Nations, Sarnia, and Wallaceburg communities. Even well-intentioned and probably effective programs like the CCPA's Responsible Care program have failed to dispel this distrust, in part because they lack regulatory requirements for measurable goals, timelines, or external validation for reducing chemical hazards. The fact that spills continue despite decades under the

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Responsible Care program suggests that there is indeed justification for this distrust.

Recommendation 28: *We recommend that the Ministry work with local communities, the Ministry of Health and Health Canada to compile and evaluate available human epidemiological and ecosystem health data to determine if possible whether local First Nations communities, Sarnia, and Wallaceburg experience higher levels of particular health/environmental effects than the rest of Ontario or the rest of Canada. The communities should be involved in the design and execution of any study, and in the interpretation of results. The results of such studies should be published in plain language summaries in addition to full technical text.*

Finding 15: Existing communication and community participation mechanisms are ineffective

Throughout our work, we observed a “disconnect” between members of the public, who felt uninformed and powerless, and Ministry and industry representatives, who were equally frustrated that their own communication efforts were not more successful. We perceived two related problems here. The first is that existing communication mechanisms between the Ministry and the public, and between industry and the public, are not working as effectively as they might. Much of the Ministry’s current information resources are housed on web sites, for instance. Yet a majority of the citizens with whom we spoke were uncomfortable accessing technical information on the Internet, and had great difficulty understanding the intent and scope of existing environmental statutes, regulations, and policies. Furthermore, members of the public are largely unaware of the regulatory structure pertaining to spills management and pollution abatement in general, including the nature and provisions of water effluent and air regulations, the “Spills Bill”, the EBR and its rights and protections. There is a perception that the Ministry does not welcome public questions, and/or that information will not be available in a form that is readily understood by lay people. Yet members of the communities are deeply concerned about their air and water quality, and frustrated by a perceived lack of access to information. We were powerfully and repeatedly reminded of the power imbalance between the Ministry and the average citizen. The former is seen to hold the information and make the decisions, while the latter bears the financial and health burden of environmental management actions.

We believe that this problem is tied in part to a lack of satisfactory mechanisms for community participation in environmental decision making. Although we recognize the opportunities for comment and action

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afforded by the Environmental Bill of Rights and its Environmental Registry, those mechanisms are poorly understood by local residents, and thus underutilized for the achievement of community objectives. We were also concerned that opportunities for public involvement come relatively late in the process, after problems have been identified and analyzed, and tentative solutions developed. **It is essential that the Ministry engage the public in a participatory approach for environmental decision making in the St. Clair River area at an earlier stage in the policy process.** It is clearly not enough to inform the public of proposed actions via the Environmental Registry. The public need to be active partners in decision making, from identification of environmental problems, through decisions about acceptable security/risk and associated laws and policies, to a fully transparent and accountable enforcement system. Some communities are at greater risk because of close proximity to industry, so when changes are contemplated in policies, programs, or regulations **those communities must be consulted face-to-face.**

Recommendation 29: *We recommend that the Ministry initiate a consultation process with local communities to determine how best to involve them equitably and meaningfully in key environmental policy processes and management decisions.*

In terms of information dissemination alone, we believe that there is much that the Ministry could do to improve communication with local communities, not just in the St. Clair River area but elsewhere in Ontario. We ourselves found the Ministry's web site difficult to use, and much of the information we needed and expected to find was not easily available on line.

Many options exist for improving communications. They include plain language summaries of key documents, laws, and policies; automated "smart" email and telephone information services that route context-specific information to callers; a telephone hotline; or one or more full-time community outreach officers, whose principal job is to serve as a lay liaison between industry, the Ministry, and members of the community. One very attractive option is to establish community- or public-liaison committees, as are sometimes now imposed on a company as a condition in a Certificate of Approval. We believe that such committees have powerful potential not only to build capacity and increase awareness on both sides, but also to improve the quality of environmental decision making by encompassing a wider range of expertise. We understand that not all such committees have worked well in the past, but we believe it

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would be worth investigating what factors encourage success⁸, so that future committees can be structured effectively. Membership is a particular issue here, including both the selection and replacement of members. Such committees need not impose a cost burden on the community, especially if costs are borne by the company.

Recommendation 30: *We recommend that the Ministry investigate alternative mechanisms for communicating with local communities, to supplement existing Internet and print materials. These mechanisms could include appointment of one or more community liaison officers and/or establishment of community liaison committees.*

Recommendation 31: *We recommend that the Ministry develop plain language summaries of statutes, regulations, and policies, to be made available in electronic format on the Ministry's web site and in hard copy in public locations such as libraries. Such summaries should also be included on the Environmental Registry each time a new policy or instrument is proposed.*

Recommendation 32: *We recommend that the Ministry in cooperation with industry make available plain language information about the toxic properties and proper handling of common industrial chemicals on its web site and in public locations such as libraries.*

We observed that monitoring and compliance information for Chemical Valley facilities was largely unavailable to the public and indeed to us. We note that the Clean Water regulations require preparation of an annual report, housed at the discharger's facility, on routine monitoring and the facility's compliance record for the previous year. Yet most people are unaware of these requirements, and we found no evidence that these reports are ever consulted at all. As a result, there is a perception of a lack of transparency in compliance reporting, although the facility may in fact be in compliance with reporting requirements.

Recommendation 33: *We recommend that the Ministry review and substantially revise its web site to make it more inviting and user friendly, including incorporation of easy access to current monitoring and compliance reports, computer simulations of routine and spill conditions, statutes and regulations, and staff directories and other contact information.*

⁸ There is a wide array of literature on the design of effective community liaison committees that would be helpful in informing this discussion.

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(We note that implementation of this recommendation would likely require modest amendments to current public reporting requirements. For example, under the Clean Water regulations, which were drafted before the advent of current Internet technology, such reports are currently held in hard copy at the discharger's facility.)

In addition to information availability, we believe that there is a need to support the existing capacity in local communities to understand both the nature of environmental issues and the potential solutions for them. This type of capacity building is not a "top down" activity directed by engineers and scientists. Rather, it should be a peer-to-peer learning experience characterized by mutual respect and equitable access to information. Dow's stormwater treatment wetland is one example of a cooperative venture with the St. Clair Regional Conservation Authority. Grassroots organizations such as environmental non-government organizations are important mechanism for information dissemination and capacity building. It would be possible for the Ministry to establish a competitive grant program for these kinds of groups, to support projects designed to improve local environmental awareness and involvement.

Recommendation 34: *We recommend that the Ministry explore mechanisms for supporting and increasing community capacity to understand and manage environmental systems. Possible approaches might include collaborative and cooperative projects with local communities, such as stormwater treatment wetlands that also provide recreational, environmental, and educational benefits, and financial support for local environmental non-government organizations.*

Recommendation 35: *We recommend that the Ministry explore the potential for employing local youth in restoration projects, as a means of building local capacity to understand and manage environmental systems.*

4. Conclusions

Our time frame was much too short to allow an in-depth examination of the legal, procedural, and engineering systems for spills prevention and management in the St. Clair River. In addition, and for a number of reasons including confidentiality and pending enforcement actions, we were unable to access a large number of documents that we had requested. These two factors have limited our ability to confirm assertions made by various parties and conduct a thorough arm's length analysis of the causes of and responses to spills in the St. Clair River area.

Nevertheless, several themes recurred in our work, and we believe that they point to a need for substantive change in Ontario's environmental management framework. We found a system that was largely in compliance, yet where spills to air and water still occur from time to time. We could not therefore avoid the conclusion that the existing system of approvals, inspection, enforcement, and prosecution is not working as well as it should – that, despite its best intentions, the current system does not encourage pollution or spills prevention, or the regular updating of technology and operating systems.

These observations speak to a complex set of circumstances, involving failures not only of infrastructure but of operating procedures and associated human resources. As a result, it is our view that there is no simple solution for the prevention and management of spills in the St. Clair River area. Although some short-term actions are possible and necessary, we believe that a long-term solution will require a multi-pronged approach, including revisions to the regulatory framework. It was our impression that Ontario's regulatory system has not kept pace with progressive jurisdictions elsewhere in the world, which employ a more diverse management toolkit and a risk-based approach.

We regret that our brief time frame did not allow us to complete the last part of our mandate, to investigate the health, environmental, community and business impacts for each solution. We recommend that consideration of this task be deferred until the Ministry has had an opportunity to review this report and its recommendations, and determine appropriate next steps.

The comments provided in this report are our personal opinions and not the opinions of any constituency we serve, and are offered only in our personal and professional capacities. We hope that our findings will stimulate a more in-depth analysis of the technological, regulatory, and

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behavioural factors that underlie spills, and prompt a substantive public dialogue about the prevention and elimination of spills events in the St. Clair River region and elsewhere in the Province.

5. Summary of Findings and Recommendations

Please note that the following summary is provided for convenience. Individual recommendations are best understood in the context of the explanatory text that accompanies them in the report.

Finding 1: *Ontario's environmental management framework is largely reactive, not preventive*

Recommendation 1: We recommend that the Ministry pursue the development of regulatory requirements for pollution prevention, either through standalone legislation or by amending the Ontario Environmental Protection Act to extend the authority to write regulations that apply to all stages of a product or substance life cycle.

Recommendation 2: We recommend that the Ministry pursue the development of regulatory requirements for spill prevention, perhaps as a condition of Certificates of Approval.

Recommendation 3: We recommend that the Ministry explore the possibility of introducing the most stringent air, water, and waste emission standards possible for "green field" sites and for new developments on existing sites, including additional integrated development of existing facilities.

Recommendation 4: We recommend that the Ministry investigate the current status of stormwater management planning under the Clean Water regulations to ensure that existing plans are adequate to address current and projected extreme events under climate change scenarios.

Recommendation 5: We recommend that the Ministry and industry begin immediately to develop multistakeholder planning for operations under projected climate change, catastrophic natural events, or terrorism.

Finding 2: *Current approaches to managing spills are not sufficiently risk-based*

Recommendation 6: We recommend that the Ministry consider adopting a comprehensive risk-based approach for classifying, preventing and managing spills in Ontario, including creation of unambiguous definitions of spills to air and water.

Recommendation 7: We recommend that the Ministry investigate the potential of a risk-based approach to spills response, including a tiered enforcement strategy employing tickets for minor offences, and more in-depth investigation and enforcement action for major offences.

Recommendation 8: We recommend that the Ministry investigate the potential for creating a tiered enforcement program based on dischargers' spills and general compliance records.

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Finding 3: *Ontario's approvals framework is cumbersome and outdated*

Recommendation 9: We recommend that the Ministry review and consider significant revisions to its existing approvals and enforcement regime, to ensure that it accommodates regular review and revision of discharge limits, based on comprehensive assessment of ambient environmental quality, while maintaining an adequate audit and enforcement function on behalf of the people of Ontario.

Recommendation 10: We recommend that the Ministry explore mechanisms for periodic review and revision of regulatory limits for air, water and waste emissions, preferably on a five-year rolling cycle, including the form of limits and the penalties for noncompliance, to ensure that they are sufficiently protective of environmental systems while recognizing the inherent variability of industrial processes and discharges.

Recommendation 11: We recommend that the Ministry work with dischargers to determine the need for and level of multiple barriers separating high-risk technologies like once-through cooling water systems from receiving waters, and develop associated regulatory requirements.

Recommendation 12: We recommend that industries in the Chemical Valley explore the potential for communal storage and treatment of stormwater and other water effluents designed to accommodate predicted storm intensities under climate change scenarios.

Finding 4: *The Ministry's current environmental management system does not employ the full range of available tools*

Recommendation 13: We recommend that the Ministry develop a legislative framework that incorporates both "sticks" and "carrots" - economic incentives such as grants, low-rate loans, accelerated depreciation programs, and similar mechanisms – for dischargers who are able to demonstrate a specified level of environmental performance or reduction beyond compliance levels.

Finding 5: *The number and training of staff may be important factors in spill prevention and response*

Recommendation 14: We recommend that the Ministry evaluate the effectiveness of current training and certification programs, and consider related conditions under Certificates of Approval and Control Orders. Such training should include performance-based training, mandatory retraining and upgrading, mandatory debriefing and associated retraining following spill events, and must include preparation for both routine and emergency situations.

Finding 6: *Current Ministry monitoring systems appear inadequate to assess ambient conditions*

Recommendation 15: We recommend that the Ministry in collaboration with industry and the communities review the goals of point-of-release and ambient environmental monitoring programs and reevaluate the effectiveness of existing

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monitoring networks for achieving those goals with the most appropriate division of responsibility.

Recommendation 16: We recommend that the Ministry in collaboration with industry and the communities evaluate potential for financing and use of state-of-the-science in situ sensors to provide a continuous feed of high quality data to operators and regulators.

Finding 7: *Laboratory analysis is slow and hampers spills response*

Recommendation 17: We recommend that the Ministry explore opportunities for establishing analytical capability in or near Sarnia, to reduce turnaround time for laboratory analysis and improve the Ministry's ability to monitor and respond to spills and their impacts.

Finding 8: *There is no regulatory requirement for laboratory accreditation in industrial self-monitoring*

Recommendation 18: We recommend that the Ministry impose regulatory requirements for accreditation of private laboratories used in industrial self-monitoring and associated reporting. The results of laboratory accreditation exercises should be transparent to the public, for instance on a web site.

Recommendation 19: We recommend that the Ministry consider options for MOE certification of accredited private laboratories engaged in analysis of routine and emergency ambient monitoring samples.

Finding 9: *Spill contingency plans are not transparent to the public*

Recommendation 20: We recommend that the Ministry require review and revision of a facility's spill contingency plans following a spill event.

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Recommendation 22: We recommend that the Ministry consider expanding its in-house computer simulation expertise to ensure adequate capability for simulating the behaviour and effects of spills.

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Finding 13: Jurisdictional confusion may be slowing spills response and notification

Recommendation 26: We recommend that the Ministry, in cooperation with Environment Canada and Indian and Northern Affairs Canada, immediately begin a dialogue with First Nations in Southwestern Ontario to explore legislative and policy solutions for resolving the jurisdictional issues that currently delay environmental response and prevent meaningful involvement of the First Nations communities in environmental decision making.

Recommendation 27: We recommend that the Ministry work with the Michigan Department of Environmental Quality, US EPA, and Environment Canada to expand the Four Party Letter of Agreement to include a process for harmonizing notification and communication processes on both sides of the St. Clair River.

Finding 14: Local communities have been gravely impacted by spills

Recommendation 28: We recommend that the Ministry work with local communities, the Ministry of Health and Health Canada to compile and evaluate available human epidemiological and ecosystem health data to determine if possible whether local First Nations communities, Sarnia, and Wallaceburg experience higher levels of particular health/environmental effects than the rest of Ontario or the rest of Canada. The communities should be involved in the design and execution of any study, and in the interpretation of results. The results of such studies should be published in plain language summaries in addition to full technical text.

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Recommendation 29: We recommend that the Ministry initiate a consultation process with local communities to determine how best to involve them equitably and meaningfully in key environmental policy processes and management decisions.

Recommendation 30: We recommend that the Ministry investigate alternative mechanisms for communicating with local communities, to supplement existing Internet and print materials. These mechanisms could include appointment of one or more community liaison officers and/or establishment of community liaison committees.

Recommendation 31: We recommend that the Ministry develop plain language summaries of statutes, regulations, and policies, to be made available in electronic format on the Ministry's web site and in hard copy in public locations such as libraries. Such summaries should also be included on the Environmental Registry each time a new policy or instrument is proposed.

Recommendation 32: We recommend that the Ministry in cooperation with industry make available plain language information about the toxic properties and proper handling of common industrial chemicals on its web site and in public locations such as libraries.

Recommendation 33: We recommend that the Ministry review and substantially revise its web site to make it more inviting and user friendly, including incorporation of easy access to current monitoring and compliance reports,, computer simulations of routine and spill conditions, statutes and regulations, and staff directories and other contact information.

Recommendation 34: We recommend that the Ministry explore mechanisms for supporting and increasing community capacity to understand and manage environmental systems. Possible approaches might include collaborative and cooperative projects with local communities, such as stormwater treatment wetlands that also provide recreational, environmental, and educational benefits, and financial support for local environmental non-government organizations.

Recommendation 35: We recommend that the Ministry explore the potential for employing local youth in restoration projects, as a means of building local capacity to understand and manage environmental systems.